# StreamStor Amazon
# Real-time Disk Controller

# Installation and User Manual

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# About This Manual

This manual is intended to serve the following purposes:

* to provide an overview of the StreamStor Amazon Real-Time Storage Controller

* to act as a guide for hardware installation

* to act as a reference for the operator

* to provide guidance on software capabilities and choices

It is suggested that you periodically check the Conduant web site for the most recent software updates, application notes, and technical bulletins.

If you are unable to locate the information you need, please feel free to contact us by e-mail or phone.

# About the Amazon Real-Time Storage Controller

Thank you for purchasing a StreamStor Amazon Real-Time Storage System. Your StreamStor system is a disk-based, real-time recording system for PCI bus computers. The StreamStor system consists of a controller card that plugs into the PCI bus, high performance disk drives, device drivers, software development tools, and additional utility software. The Amazon controller can also include an optional daughter board to provide external data interfaces for data recording and playback.

The PCI bus is a high performance I/O bus designed for attaching peripheral devices to computer systems. It is found in computing systems from many different manufacturers and is supported by most major operating systems. By utilizing the PCI bus instead of a proprietary bus interface, StreamStor provides an open platform recording system. PCI data acquisition cards (digital oscilloscopes, frame grabbers, telemetry interfaces, etc) are available from many manufacturers to collect data and record it to system memory in real time ( as it is collected ). StreamStor provides a large capacity and cost effective alternative to system memory for these applications.

The StreamStor Storage System is able to receive data over the PCI bus directly from the data acquisition device at very high average (sustained) data rates. Virtually all of the available PCI cards that can record data to system memory are compatible with StreamStor. Only minor software modifications are generally required to redirect data to the StreamStor PCI card. This capability is often in the software provided by the manufacturers of data acquisition devices. Conduant maintains a list of tested configurations, please contact technical support for more information.

StreamStor was specifically designed to record sequential data without interruption at very high data rates. This is in contrast to traditional storage systems that are designed for data processing purposes and cannot sustain these high data rates. Unlike typical computer disk storage solutions that are designed for optimum performance during random data reads and writes, StreamStor has been designed for optimum performance in sequential read and write operations. The StreamStor system has also been designed to operate without host computer intervention. This eliminates any bottlenecks or interruptions in the data stream due to heavy computer loads or delays.

The StreamStor Amazon card includes the capability of adding daughter boards to provide different types of external interfaces such as the FPDPII interface. These daughter boards move data to/from the Amazon board at very high data rates with very little overhead. This provides a seamless method of interfacing to nearly any external data interface for high performance recording. A hardware development kit is also available to aid users in developing custom daughter boards for unique or proprietary interface requirements.

The StreamStor SDK includes the device drivers and API (Application Programming Interface) to provide a smooth integration of StreamStor with the data acquisition device and/or analysis software. Many examples are provided with the SDK and more are available upon request.

The StreamStor system is a flexible and powerful platform for high performance recording applications. Many custom and unique capabilities are available that are beyond the scope of this documentation so please contact Conduant with your questions and special requirements.

# Components

An Amazon real-time storage system generally consists of the following components:

- Amazon PCI board
- Optional external interface board
- Disk drives
- Cables
- Software Development Kit
- User Manual

Some systems are delivered from Conduant completely installed in a chassis with a PC motherboard and operating system. You can skip the installation section for these systems since all installation has been performed at the factory.

☠ CAUTION: *Please read the entire installation section before starting to install the Amazon hardware. This manual assumes that the user is knowledgeable and comfortable with basic computer work, including installation and safety considerations. If you are unsure as to how to proceed, please contact Conduant support.*

# Unpacking / Handling

Carefully inspect all shipping packages for any sign of damage. In particular, look for wrinkled or bent corners, holes, or other signs of bad handling or abuse. If you notice any damage to the packaging, immediately open the boxes and inspect the contents for damage. Pay close attention to the components near the area where the packing material was damaged. Report any damage to the carrier and Conduant immediately.

## *Disk Drives*

Hard disk drives such as those that have been included with your system are susceptible to damage from excess shock and careless handling. Please observe the following handling precautions:

* Allow the disk drives to reach room temperature BEFORE installation. This may take several hours depending on shipping conditions. Disk drive damage can occur if the system is powered while the drives are at temperature extremes.

* Do not drop, jar or bump the disk drives. Even setting the chassis on a hard surface too roughly can damage the recording surfaces, heads, or other mechanical components inside the disk drives.

* Never disconnect/connect the interface cable while power is on.

The disk drives must be installed according to the manufacturer's instructions. Please check the manufacturer's website for the latest installation information.

## *Amazon Board*

The StreamStor controller board is shipped in a specially designed antistatic box or bag to prevent electrostatic damage to the board. To avoid damage in handling the board, take the following precautions:

* Ground yourself with a grounding strap or grasp a conductive, grounded object to dissipate any static charge while handling the board.

* Always store the board in its antistatic package when not installed in a computer system.

* Inspect the board carefully before installing in the computer. Do not install a damaged board into your computer.

* Never touch any exposed connector pins or component leads.

* Avoid bending or twisting the board.

# Planning Your Installation

The StreamStor Amazon controller board uses anywhere from 1 to 16 SATA interface cables (depending on the configuration) to connect the controller to up to 16 disk drives. Not all computer chassis layouts easily facilitate this type of cabling. The configuration and layout of the computer chassis will greatly affect the ease of installing the StreamStor system. Contact Conduant if you need help in choosing or designing an appropriate chassis. Extension chassis systems are also available to avoid impacting an existing computer system.

The controller board can utilize the following combinations of disk drives: 1, 2, 3, 4, 5, 6, 7, 8, 10, 12, 14 or 16. For best results the drives should be attached using the connectors indicated in Table 2. Prior to mounting anything in the chassis, place the disk drives and the StreamStor card on a flat, static free surface and model the routing and placement of the cables. Pay close attention to the connector keys because these may define which way the disk drives must be mounted. Avoid pinching or routing over sharp edges to prevent cable damage.

The orientation of the disk drives can greatly affect the ease of cable routing. In horizontal orientations, mounting the drive with the board facing down prevents debris from inadvertently damaging or shorting the electronics and is the preferred orientation. Generally, all drives should be mounted in the same orientation to avoid extra twists in the cables.

The maximum recommended length of SATA cables is 1 meter. Avoid the use of longer cables since they may cause intermittent data loss. Removable drive carriers add several connections to the interface bus that can also cause intermittent data problems. Several removable drive carriers are known to work with StreamStor, please contact Conduant if you have special requirements for them.

All StreamStor models are upgradeable for increased storage capacity and high sustained data rates. Please contact Conduant for more information on upgrades.

## *Controller Card*

The Amazon StreamStor controller is a full-length universal PCI card that meets the PCI 2.1 specification (figure 1). Installation requires a PCI slot that can accommodate a full size card and has a card support guide. Clearance is also required for the drive cables exiting from the controller card. The card can be used in PCI slots supporting 32 or 64 bits and 33 or 66 MHz. For maximum performance the card should be inserted into a 64 bit / 66 MHz PCI slot. Consult your system documentation for more information. An illustration of the card is shown in Figure 1 (with daughter board installed). The SATA drive connector numbering is also shown in Figure 1.

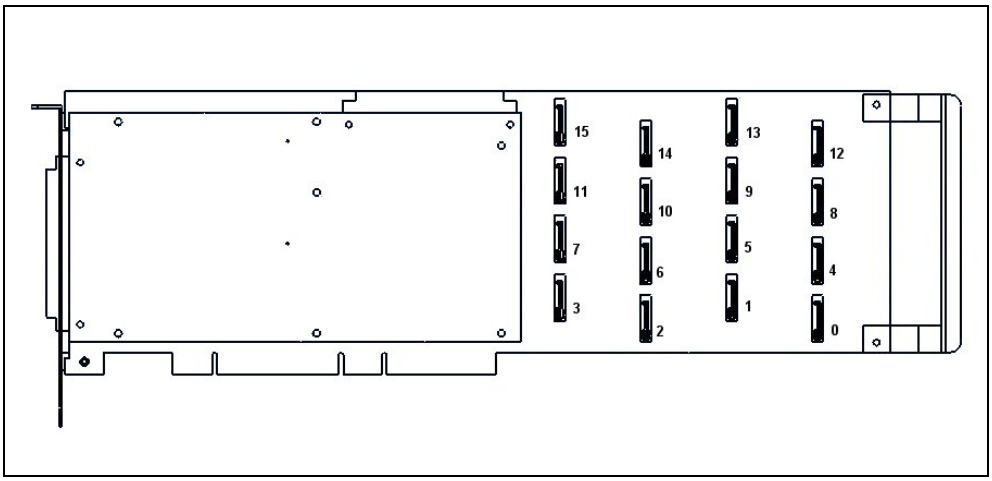


**Figure 1 - Drive Numbering**

Table 1details the connectors to use for various drive combinations.

| # of Drives | Connectors to use |
|---|---|
| 1 | 0 |
| 2 | 0,2 |
| 3 | 0,2,4 |
| 4 | 0,2,4,6 |
| 5 | 0,2,4,6,8 |
| 6 | 0,2,4,6,8,10 |
| 7 | 0,2,4,6,8,10,12 |
| 8 | 0,2,4,6,8,10,12,14 |
| 10 | 0-9 |
| 12 | 0-11 |
| 14 | 0-13 |
| 16 | 0-15 |

**Table 1 – Drive connector usage**

The following are general instructions for installing your StreamStor controller. You should also consult your computer user manual or technical reference for more specific instructions and warnings.

☠ **CAUTION:** ***Over-flexing the circuit board will damage the controller.***

☞ **NOTE:** ***You may find it easier to attach the drive interface cables BEFORE installing the controller board. Be careful to prevent damage to any components on the backside of the circuit board if you lay the card down.***

1. Turn off and unplug your computer.

2. Remove the top cover or access port to the I/O bus.

3. Remove the expansion slot cover on the back panel of the computer for the slot into which you intend to install the StreamStor controller.

4. Insert the StreamStor controller board into the chosen PCI slot. Gently rock the board to ease it into place. It may be a tight fit but do not force the board into place. Make sure that the card support bracket lines up correctly with the support provided in the computer chassis.

5. Screw the mounting bracket to the back panel of the computer chassis.

6. Proceed to drive installation and cabling.

## Drive Configuration

The StreamStor controller and drives must be attached using SATA cables. These cables are available in either a straight or right angle connector configuration and are up to 39" (1 meter) long. Both cable ends are identical and interchangeable. There are no jumpers or other settings on the disk drive to configure.

Be careful to match the connector orientation when connecting the drive to the cable and never force the connection, as this could damage the disk drive or Amazon board.

## Installing the Drives

The method used to mount the disk drives is left to you. There are many brackets available to adapt different disk drives into the chassis, please contact Conduant for more information. Be sure to follow the handling precautions described above in the unpacking/handling section when installing the hard drives.

## Connecting Interface and Power Cables

All SATA disk drives provide an integrated connector with both power and interface signals as shown in Figure 2. Be careful to support the StreamStor PCI card when plugging in the drive cables to avoid over-flexing the circuit board. Also, be careful to correctly orient the connector, since they are all keyed to prevent incorrect insertion.

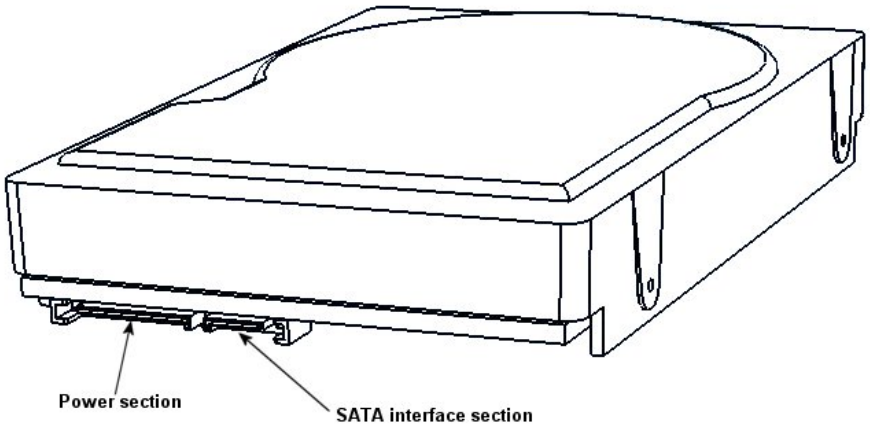


**Figure 2 - SATA Drive**

☠ **CAUTION:** ***The signal and power connectors are keyed to prevent incorrect insertion. Exerting excessive force with the connectors improperly aligned can cause damage. Even with the correct alignment, care should be taken to not apply excessive force or torque.***

Some SATA disk drives include a second power connector separate from the integrated SATA power/signal connector. These connectors allow the drive to be powered from the old style power cabling instead of from the integrated connector. Do not use both connectors to power the drive. Your installation may also utilize a backplane to make the connections to the disk drives. The SATA interface cable must then be connected to the SATA connectors on the backplane. SATA interface cables are available with either separate or integrated power and signal sections. The SATA connector on the drive is designed to allow connection of independent or integrated cables. Carefully connect and route the interface cables from the StreamStor controller to the disk drives. Refer to Table 1 to determine the correct Amazon connectors to use for your installation.

## *Drive auto configuration*

The StreamStor Amazon controller board supports auto configuration to the number of drives installed. It can support 1,2,3,4,5,6,7,8,10,12,14 and 16 drive configurations. You must connect the drives as indicated in Table 1. Always check that all drives are being recognized by the system using the `XLRGetDeviceInfo` function call. The `sscfg.exe` program also reports this information after initialization.

# Installing the Software

Your StreamStor system was shipped with the Software Development Kit on CD-ROM. Install the software prior to installing the hardware if possible. On Windows systems, when ready, run the `setup.exe` program on the CD-ROM to start the installation process. On Linux systems, refer to the file `linux/docs/install.txt` on the CD-ROM.

Plug and play operating systems such as Windows will detect the installation of the StreamStor board and attempt to configure the boards using the hardware plug and play wizard program. The required installation information file for plug and play installation is included on the CD-ROM. Make sure the plug and play wizard includes the CD-ROM drive in its search so that the StreamStor drivers will be properly installed. You should not cancel the plug and play wizard since this can create hardware conflicts in the system when using the StreamStor controller. Note that the. `setup.exe` program must still be executed to install the StreamStor SDK onto your system.

The software installation procedure will install the device drivers, library files, example programs and all other components of the SDK onto your system.

The StreamStor SDK does not include software interfaces or drivers used for the control of data acquisition cards made by other manufacturers. However, it does include some sample programs to help in your software development efforts. Other drivers and examples may be available depending on your choice of data acquisition hardware. Contact Conduant support for more information.

Always review the **`readme.html`** file included with the SDK for the latest information not included in this manual. Also, check the Conduant web site periodically for additional information.

# Software Functionality

The Amazon StreamStor controller supports recording and playback (or read) from the PCI bus at up to 200 MB/s and from a daughter board interface at up to 500 MB/s. The following API commands are supported by the Amazon controller:

- XLRApiVersion
- XLRAppend
- XLRBindInputChannel
- XLRBindOutputChannel
- XLRCardReset
- XLRClearChannels
- XLRClearOption
- XLRClearWriteProtect
- XLRClose
- XLRDeleteAppend
- XLRDeviceFind
- XLRDismountBank
- XLREdit/XLREditData
- XLRErase
- XLRGetBankStatus
- XLRGetBaseAddr
- XLRGetBaseRange
- XLRGetDBInfo
- XLRGetDeviceInfo
- XLRGetDeviceStatus
- XLRGetDirectory
- XLRGetDriveInfo
- XLRGetDriveTemp
- XLRGetErrorMessage
- XLRGetLabel
- XLRGetLastError
- XLRGetLength
- XLRGetLengthPages
- XLRGetLengthLowHigh
- XLRGetMode
- XLRGetOption
- XLRGetPartitionInfo
- XLRGetPlayBufferStatus
- XLRGetPlayLength
- XLRGetSample
- XLRGetSystemAddr
- XLRGetUserDir
- XLRGetUserDirLength

- XLRGetVersion
- XLRGetWindowAddr
- XLRMountBank
- XLROpen
- XLRPartitionCreate
- XLRPartitionSelect
- XLRPlayback
- XLRPlaybackLoop
- XLRPlayTrigger
- XLRRead, XLRReadData
- XLRReadFifo
- XLRReadImmed
- XLRReadSmartThresholds
- XLRReadSmartValues
- XLRReadStatus
- XLRRecord
- XLRRecoverData
- XLRReset
- XLRSelectBank
- XLRSelectChannel
- XLRSelfTest
- XLRSetBankMode
- XLRSetDBMode
- XLRSetLabel
- XLRSetMode
- XLRSetOption
- XLRSetPlaybackLength
- XLRSetPortClock
- XLRSetReadLimit
- XLRSetSampleMode
- XLRSetUserDir
- XLRSetWriteProtect
- XLRStop
- XLRTruncate
- XLRWrite, XLRWriteData

The Amazon software does not currently support event capture or simultaneous playback while recording. See the StreamStor SDK user manual for more information.

# Daughter Boards

The Amazon StreamStor controller includes the capability to add a daughter board (mezzanine) with its own connectors and electronics to provide an alternate method of transferring data into and out of StreamStor. These additional paths offer several advantages, including:

- freedom from interaction with other devices on an arbitrated bus such as PCI;
- the reduction or elimination of bus FIFOs that may otherwise be required to interface with an arbitrated bus;
- full isolation of the data path from operating system and computer hardware facilitates predictable and repeatable behavior;
- better or additional control over timing and other parameters;
- higher bus utilization efficiency due to a non-arbitrated nature;
- access to interface signals without risk of crashing host computer;
- higher data rates than the most common PCI buses support; and
- the potential for dual-port operation (simultaneous transfers on both PCI bus and external ports) while recording or playing back.

If an optional daughter board is ordered with your Amazon board it will come completely installed and ready to use. The `XLRSetDBMode` function in the API is used to program the behavior of the daughter boards and the modes and options are unique to the specific type of daughter board installed. Please refer to the programming manual provided for your specific daughter board. These documents use the naming convention "DB_xxxxx.pdf" where "xxxxx" is the interface type implemented by the daughter board (e.g. DB_FPDP2.pdf) and are also available on the CD delivered with your system.

# Technical Support

Conduant wants to be sure that your Amazon StreamStor system works correctly and stays working correctly. In the event, however, that you are unable to get your new system to work properly, or if a working system ceases to function, we will do all that we can to get your system back online.

Solving the problem is largely a matter of data collection and steps that must be taken one at a time. In order for us to better serve you, we ask that you take the time to perform the following steps prior to calling us. This way, you can provide us with the most meaningful information possible that will help us solve the problem.

*Is the problem one that obviously requires replacement parts due to physical damage to the system? If yes, then please gather the information described below and report the problem to tech support, by phone or through the Conduant web site.*

*Have you confirmed that no cabling has been inadvertently disconnected or damaged while working around the equipment?*

*Is the StreamStor card properly seated in the PCI (CPCI/PXI) slot?*

*Do all the systems have good power connections and voltages?*

*Does the confidence test sscfg.exe (on Windows) or ssopen/sstest (on Linux) run OK?*

*Has the software installation been corrupted? Try re-installing software.*

*Have you checked the Conduant web site for technical bulletins?*

*Have you recently installed a new Linux kernel or compiler or a new Windows Service Pack?*

If the above steps did not resolve the problem, then please initiate a trouble ticket on the support section of the Conduant website at www.conduant.com. Please provide as much information about your system and the problem as possible. We will do all that we can to resolve the problem as quickly as possible.

## *Contacting Technical Support*

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Web: www.conduant.com

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Technical Support
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